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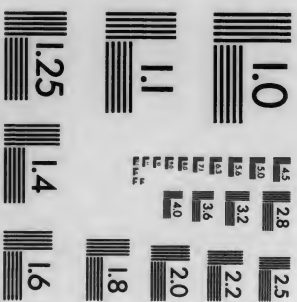


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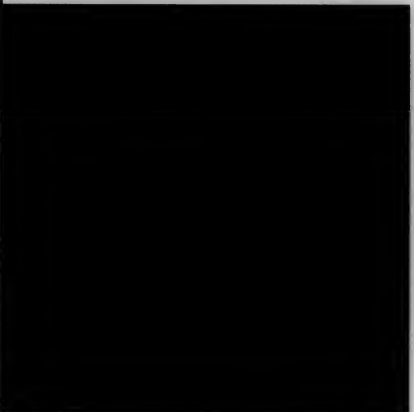
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RAILWAY STATISTICS

AS APPLICABLE TO

EARNINGS OF PASSENGER TRAINS

WITH A VIEW OF

DETERMINING APPROXIMATE REVENUE AND DECIDING
AS TO NUMBER AND TIME OF TRAINS TO BE RUN
FOR THE ACCOMMODATION OF THE PUBLIC.

A PAPER

BY

M. RIEBENACK,

*Assistant Comptroller and Auditor of Passenger Receipts,
Pennsylvania Railroad Company,*

READ AT THE
FIFTH BIENNIAL SESSION

OF THE
INTERNATIONAL STATISTICAL INSTITUTE,

HELD IN CHICAGO, ILL.,

SEPTEMBER, 1893.

WITH COMPLIMENTS OF

M. RIEBENACK,

ASSISTANT COMPTROLLER

PENNSYLVANIA RAILROAD COMPANY.

INTENTIONAL SECOND EXPOSURE

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Availing myself of the latitude granted by your committee's representative in his letter conveying the information that I had been selected to prepare a paper on "*Railway Statistics as Applicable to Earnings of Passenger Trains, with a View of Determining Approximate Revenue and Deciding as to Number and Time of Trains to be Run for the Accommodation of the Public*," I shall take the liberty, preliminary to entering upon a discussion of the subject, of making some reference to the accounting and passenger departments of American railways, and their functions as generally organized. These remarks will be of a general and explanatory character, calling attention to past conditions and the rapid growth and development of the railway passenger train service leading to the necessity for current statistics of the character it is proposed to describe.

The demand for reliable figures from which to obtain the earning capacity, as well as the current expenditures of railroads, in detail, was one of the principal causes for the establishment of the accounting department by railway corporations. This department—the auditing bureau—is the one to which railway managers turn for definite information in relation to current, general and detailed earnings and expenditures of the road. It is there that specific and absolute attention is given to statistical details. This department also handles all data bearing upon the cost of management and operation of the road's various divisions and branches, whether on passenger or freight account, or on general or special business. These latter figures are audited, compiled and reduced to statement form, in order to meet demands made for comparative statements showing the cost of operation for any given period.

It is not the purpose to consume time by enumerating the almost infinite variety of items which affect the earnings of the passenger traffic. Past experiments and inventions of man in the mechanism and applications for railway passenger service are undergoing phenomenal evolution, the tendency of which is conspicuously and invariably for insuring safety, speed and comfort. In a retrospective glance at the improvements and realizations of the last ten years in railroad operation, we are at once amazed by the incontrovertible evidences of the great and sweeping advances that have been made in every avenue. Our locomotives are marvels of power and speed, having been brought to what we may almost consider a state of perfection by the inventive genius of the best mechanical minds. The model railway passenger train is a combined master-piece, embodying the talent and ability of the inventor, car-builder, upholsterer, artist, designer and decorator; possessing sumptuousness, oriental luxury, rich coloring, striking effects, solid comfort and every possible convenience. Truly, the powers of invention and the highest skill and artistic talent have been called into requisition by the railways.

The traveling public to-day receives from railroad companies for a given sum a much larger equivalent than formerly. It is hardly necessary to call to mind the old-time passenger shed and the unsightly and uncomfortable cars, that comparisons may be had with to-day's magnificent railway structures, representing the highest architectural skill and large outlays in money, and the advantages of present car arrangements in such essential matters as heating, lighting and ventilating, with the increased parlor, dining, buffet, sleeping and observation car service. These introductions of improved service have largely banished the fatigue and discomfort incident to travel in the not very remote past, and transformed the tiresome railway journey into one of rest and enjoyment. The luxurious ease and unvarying comfort afforded by the famous solid-vestibuled palatial cars are rendered doubly enjoyable from the fact

that the high speed attained is sustained with almost absolute safety.

Very properly and wisely are we impelled by financial interests to inquire into the means of providing the best train service warranted by the earnings derived from the passenger traffic. Tabulated statements of earnings and expenses, as well as numerous other data, in these closing days of the greatest century of civilization, have become truly wonderful aids to success, requiring the employment upon them of the best skill and ability of statistician and mathematician, under the supervision of railway officials of large experience and practical education.

For the owners of the millions of dollars now invested in railway property, these annual or other statements invariably possess intense interest. No railway management should lose sight of the governing fact that the affairs of the company should be conducted in the best interests of its owners, to whom its general financial condition and earning capacity can only be made known through comprehensively and carefully compiled statements. In the past the study and compilation of railway statistics in the United States have not been conducted upon clearly defined lines, as a whole, calculated to produce beneficial or valuable results. On the contrary, they have been largely the creatures of individual preferences, as represented or dictated by the managers of the various roads, by whom they have been accordingly influenced. While some roads have adhered to records based upon similar methods of preparation, others have ignored such records, or have been governed by plans totally dissimilar, thus occasioning confusion and rendering them of little value for practical purposes.

The annual joint conferences of the Interstate Commerce Commission and the representatives of the various State railway commissions (inaugurated about five years since) are fast developing a uniform basis for furnishing statistics. The results so obtained, if properly handled, will go far towards solving what is termed the "railway

problem." Divested of the mysticism commonly ascribed to the word "problem," this term "railway problem" means a just basis for rates, a due maintenance of the same and the permanent establishment of measures preventive of injurious or unreasonable discriminations.

When I entered the passenger service of the Pennsylvania Railroad Company in 1865, one of the most complicated questions vexing and perplexing the operating officers of the road was in the form of petitions and letters from patrons of the line, inviting, arguing for and demanding increased train service, especially at terminal points and principal cities along the road. The Pennsylvania then had a passenger revenue of \$6,376,079.14 per annum, and carried 3,611,086 passengers.

Since 1859 there has been in operation a system of daily train reporting by ticket agents, exhibiting the sales of all local tickets. An effort was directed toward the consolidation of train information on the basis of these reports and approximating the sales of all other kinds of tickets, thereby providing a means of dividing the revenue arising therefrom among the various trains. This plan proved very unsatisfactory, as it required a large clerical force at the company's general office, and it was impossible to obtain the results until months after the business had passed over the line, so that it was finally abandoned and the information desired sought for in other directions.

The devising of more efficient means for this purpose was not pushed to practical completion until another problem confronted the company in the shape of the anticipated heavy travel incident to the Centennial Exposition in Philadelphia in 1876. Finding that the then limited number of passenger trainmen would be unable to cope with the increased volume of passenger business during that exposition, it was suggested that freight crews could be pressed into the passenger service. This suggestion was embarrassed by the fact that those employes were not competent to deal with the various complications and limitations incident to the tickets then in use.

The company met the question in the fall of 1875 and spring of 1876 by the employment of young men who had previous experience in commercial life, to whom were given full and complete instructions respecting the kinds, conditions and peculiarities of tickets, with a view to engaging their services solely for the collection of tickets and fares on trains. They were drilled also in the knowledge of time-tables, the baggage-checking system and other duties requiring intelligence and reliability in their relation to passengers. These employes were known as "train agents," to distinguish them from conductors, the latter being in full charge on the train with the former as aids. The selection of train agents was made on the basis of gentlemanly appearance and deportment, as well as clerical ability, which would equip them acceptably for contact with the traveling public. One of their most important duties was the preparation of reports exhibiting in detail the entire travel on the several trains, thus furnishing the solution of the problem as to the obtaining of satisfactory train information.

To further the handling of the business and improve the character of reports of the traffic, there was inaugurated a system of "ticket receivers." Competent men, selected from the general office staff and designated as ticket receivers, were appointed and placed at terminal or other important stations to receive cash and ticket collections from conductors and train agents, make up statements of the business and money value of each run made, and adjust differences with passengers, which were unavoidable under the pressure of so large a business of a new character coming on the line.

At the close of the Centennial Exposition there arose the question of the advisability of continuing the service of train agents, or returning to the old system of conductors. Economic features largely influenced the decision of this question, which resulted in the restoration of the former system of conductors, but under changed conditions. The ticket receivers' system was continued and extended

under enlarged powers, and a high standard of qualification required of parties in charge of such offices.

The ticket receivers, as well as the clerks in their offices, receive a thorough training in the auditor's office before appointment to the position, so as to be well versed in all the rules and regulations of the department connected with the business of passenger transportation, have a geographical knowledge of railroads and connecting points, and possess good judgment to the end that their decisions pertaining to the validity of tickets, or other matters about which there may be a disagreement among passengers and conductors, shall be equitable as between passengers and the company.

The conditions under which conductors were assigned to passenger trains were also changed, and a higher grade of efficiency demanded. In addition to passing an examination from a transportation standpoint, they are now required to be instructed and to pass an examination in the auditor's office, to demonstrate their qualifications for accounting duties, before they are placed in charge of passenger trains. They must prove themselves possessed of fair education, good clerical abilities, and a thoroughly practical knowledge of the classes and conditions of tickets which are presented on trains as equivalents for rides, and must have an intelligent conception of any and all relations that may arise among passengers and the company. As a result of the instructions given and a subsequent examination they are classified and graded. Those passing No. 1 or No. 2 are assigned the most important runs; those passing No. 3 are assigned to such runs as do not offer so great variety and complication in tickets and information.

Illustrative of the increased knowledge necessary—owing to the expansion of territory and variety of travel—for the proper handling of train business, the following comparative table is given, showing the classes of tickets in use in the current year, 1893, as contrasted with those of 1872:—

LOCAL.—As applicable to traffic originating at and destined to points on same line.

1893.	1872.
Regular.	Regular.
2d class.	Commercial.
Accommodation.	Accommodation.
Special.	" special.
" employees'.	Special.
Strip.	Emigrant.
Limited.	" special.
Continuous passage.	Clerical.
Clerical.	Excursion.
Excursion.	" special.
" comb. and seashore.	" summer.
" special.	10-trip.
" two-day.	12-trip.
" five-day.	18-trip.
" employees'.	25-trip.
" summer.	16-trip.
" special.	26-trip.
10-trip workmen's.	30-trip.
10-trip.	46-trip.
20-trip employees'.	50-trip.
25-trip.	54-trip.
26-trip.	Quarterly.
46-trip.	Commutation.
46-trip employees'.	Regular (conductors').
50-trip.	Special "
50-trip employees'.	Emigrant "
50-trip special.	Excursion "
50-trip season.	75-trip.
54-trip.	100-trip.
54-trip employees'.	Employees' commutation.
60-trip.	
60-trip employees'.	
Quarterly.	
Quarterly employees'.	
Strip employees'.	
Workmen's.	
" 50-trip.	
" 54-trip.	
Annual.	
100-trip season.	
100-trip annual.	
150-trip.	
150-trip season.	
150-trip season, employees'.	
300-trip annual.	
360-trip.	
Irregular commutation.	
Parlor car.	
Street car (agents).	
Regular (conductors').	
Accommodation (conductors').	
Clerical "	
Excursion "	
" two-day "	
Street car "	
Parlor car "	

INTER-ROAD.—As applicable to traffic originating on a certain line and destined to points on another line.

(Also known as Foreign Tickets.)

1893.	1872.
First class.	First class.
Limited.	Second class.
Second class.	Special.
Special.	Emigrant.
Clerical.	Excursion.
Emigrant.	Commutation.
Excursion.	Extra fare.
" special.	Accommodation.
" employes'.	
" summer.	
" " special.	
" winter.	
" " special.	
" comb. and seashore.	
Commutation.	
Mileage.	
Extra fare.	
Penna. R. R. parlor car.	
N. Y. & L. B. R. R. parlor car.	

INTER-ROADS.—As applicable to traffic originating on another line and destined to points on a certain line.

(Also known as Foreign Roads.)

1893.	1872.
First class.	First class.
Special.	Special.
" time.	Emigrant.
" " second class.	Excursion.
Clerical.	" special.
Emigrant.	Extra fare.
Excursion.	Second class.
" special.	Accommodation.
Commutation.	
Extra fare.	

MISCELLANEOUS.—Covering tickets used for articles carried in baggage cars and for passing teams and passengers over ferries and bridges.

1893.	1872.
Mail-wagons.	Mail-wagons.
Express-wagons.	Express-wagons.
Extra baggage, local.	Extra baggage, local.
" " inter-road.	" " inter-road.
Milk, local.	" " emigrant.
" inter-road.	Milk, local.
" conductors'.	Marketing, local.
Cream, local.	Ferry collection.
" inter-road.	Incidental.
Marketing, local.	Bridge tolls.
" conductors'.	
Bridge.	
Package stamps, local.	
" " inter-road.	
Package.	
Ferry, passengers'.	
" teams.	

The summary of the various forms of tickets for the years named shows as follows:—

	1893.	1872.
One-way,	39	24
Excursion,	23	9
Commutation,	35	18
	97	51

The basis of the plan now in use on the Pennsylvania Railroad system under which the earnings of the several trains are computed is the conductor's trip report of the tickets honored, of which the following is a sample:—

PENNSYLVANIA RAILROAD COMPANY.

Mileage of Tickets on Train No. 3, from New York to Philadelphia, on.....day, the.....day of.....189

Run by.....Conductor.

Kind of Ticket.	From	To	On	Off	Number.	Distance.	Miles.

Cash Received, \$.....
 Deduct Cash not Earnings,
 Passengers and Net Cash,
 Total Pay Passengers,

Free Passengers.	Complimentary.	Legislative.	Editorial.	Employee.	Pay Passengers:
Annual Passes,					From Jersey City,
Term "					To Philadelphia,
Trip "					

Made by.....

Examined and correct.....Ticket Receiver.

A brief description of this blank may be interesting. It exhibits the kind and reading of the tickets used, whether lifted or not, the passenger mileage accruing therefrom to the particular train, or run, represented by the report, the net amount for the train from the conductor's cash collections, the total passengers carried on the trip, and also a statement of free passengers carried on the several kinds of passes, and the total passengers on train when arriving or departing from important terminals. These reports are delivered by the conductors to the ticket receivers, who consolidate the information for all trains in a daily statement to the accounting department in the following form:—

PENNSYLVANIA RAILROAD COMPANY.

Statement of the Mileage for all Passenger Business of Trains reported at Ticket Receiver's Office, at Philadelphia, for the.....day of.....189.....Ticket Receiver.

Train.	From	To	Passen- gers.	MILEAGE.			Cash.	Remarks.
				Local.	Foreign (Inter-Road)	For. Rds. (Inter-Rds.).		
3	New York.	Philada.						
5	"	"						
7	"	"						
9	"	"						
21	"	"						
23	"	"						
25	"	"						
27	"	"						
35	"	"						
41	"	"						
43	"	"						
45	"	"						
47	"	"						
49	"	"						
51	"	"						
55	"	"						
57	"	"						
59	"	"						
63	"	"						
65	"	"						
71	"	"						
73	"	"						
75	"	"						
79	"	"						
81	"	"						
83	"	"						
85	"	"						
89	"	"						
91	"	"						
93	"	"						

The ticket mileage comprised in the ticket receiver's statement is utilized in the general office in the preparation of the weekly estimate of passenger earnings, and, as the

number of passengers, cash and ticket mileage for each train are also shown separately, it is then used in the compilation of the monthly statement of train earnings, on form following:—

PENNSYLVANIA RAILROAD COMPANY.

Statement of the Number of Passengers Carried, and Earnings therefrom, on through trains from New York to Philadelphia, for the month of.....189.....

Train.	From	To	Trips.	Passen- gers.	Earnings.	AVERAGE EARNINGS.	
						Per Trip.	Per Mile Run.
3	New York.	Philada.					
5	"	"					
7	"	"					
9	"	"					
21	"	"					
23	"	"					
25	"	"					
27	"	"					
35	"	"					
41	"	"					
43	"	"					
45	"	"					
47	"	"					
49	"	"					
51	"	"					
55	"	"					
57	"	"					
59	"	"					
63	"	"					
65	"	"					
71	"	"					
73	"	"					
75	"	"					
79	"	"					
81	"	"					
83	"	"					
85	"	"					
89	"	"					
91	"	"					
93	"	"					

The number of conductors' trip reports of tickets honored made during the month of July, 1893, was 52,500, covering the running on the several divisions of about 2850 trains, carrying 5,935,400 passengers, with earnings of \$2,323,450.00, while the number of ticket receivers' consolidated statements received during the month, and which must be handled in the general office in the compilation of the weekly estimate and train-earning statements, amounted to 584, or, say, twenty-three each working day.

Through the operation of this system the accounting department is enabled to promptly lay before the transpor-

tation officers and others interested monthly statements, showing the number of passengers carried, and the total earnings and average earnings per trip and per mile run for each and every train on which passenger business was moved. The method followed in the general office in the preparation of the train-earning data is to transfer to specially prepared sheets the daily business of the several trains as exhibited by the statements from the respective ticket receivers, and at the end of the month totals are made for each train of the passengers, ticket mileage and cash collections. To the ticket mileage is then applied the average rate per mile which the actual business for the preceding month shows to have been received from passenger traffic. To the data thus obtained is added the number of passengers and amount of earnings from such of the card commutation ticket travel as is not shown on the reports rendered by conductors running on lines in certain populous districts, by reason of the impossibility of obtaining the necessary record on such trains, and which is consequently not included in the ticket receivers' statements. This commutation travel is apportioned to the several trains on the basis of percentage, arrived at by special records taken from time to time of the actual amount of this travel carried on the respective trains, which percentages are applied monthly to the sales as shown by the agents' reports. After the total earnings for the month have been arrived at, computations are made of the averages per trip and per mile run, and the information is then transferred to the final sheets for distribution to the officers interested.

The utility of the train-earnings statement as a means of information is beyond question. The comprehensive and accurate data it conveys is of signal service to the transportation officers in many respects, notably in connection with the arrangement of train service and the distribution of the car supply. It is likewise of great value as a means of comparison, extending from month to month or year to year, that will infallibly indicate—by the increase or decrease of the travel in given territories or on estab-

lished lines—the portions of road requiring attention and fostering care, and will show as well the results of any measures that may have been taken for the promotion of the passenger traffic. In accordance with modern ideas it is considered absolutely necessary that the managers of railroads be kept informed at frequent periods as to the business actually being done on their lines. The means by which this is accomplished on the Pennsylvania Railroad system is the weekly estimate. Under the present system of train earnings the passenger data necessary in connection with the estimate are easily and expeditiously collected from the ticket receivers' daily statements, on which is exhibited in consolidated form the information shown on the conductors' reports of the travel on the respective trains.

It has been my experience that the making of ticket-mileage reports by conductors has been of decided advantage to them and benefit to the service. The handling of tickets, necessary in arranging them for entry on the reports, tends to keep the conductors familiar with their appearance and privileges, and serves also as a means of education of such of their crew as may be called upon to assist in the making of these reports; also, the entry and extending of the mileage familiarize the conductors with the distance between stations on their runs, knowledge of which is of great value to them in connection with the honoring of mileage tickets. Numerous other advantages are connected with the train reports, such as, for instance, tracing tickets, determining the classes of travel on the several portions of road, keeping conductors in touch with ticket receivers and through them with the accounting and passenger departments, &c.

Since the value of a train-earning system has been proved by the experience of the Pennsylvania Railroad Company, its example has been followed by other lines, and the same plan adopted thereon, either in its entirety or in a modified form.

In conclusion, it may be proper for me to state that, while the above system is of great value and importance to

a railroad like the Pennsylvania, whose passenger service on its lines east of Pittsburg covers annually over 618,000 trips of trains, carrying 64,000,000 passengers, with a gross revenue from same of \$24,000,000.00, and whose equivalent of passengers carried one mile was, in 1892, 1,168,750,000, the expense involved in establishing ticket receivers' offices and train reporting would be too great for many roads, and only justifiable in such as have a large passenger business. Two conditions seem necessary to obtain satisfactory results for the expense involved:—

First.—The railroad's passenger business must be of sufficient volume for the estimate of its train earnings to become a factor in the adding or withdrawal of passenger trains.

Second.—That the information is also used for estimating current earnings weekly or oftener in advance of final audit of earnings from passengers.

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